

REMARKS

Applicants acknowledge the Examiner's objection to claims 10-12 that claims 10-12 would be allowable if rewritten in independent form including all limitations of base claim and any intervening claims. However, claims 10-12 have been retained in dependent form at this time.

By this amendment, new claims 17-19 have been added and claim 7 has been amended to depend from claim 4 so as to provide proper antecedence for "the aperture of the second transducer arrangement."

The ultrasonic diagnostic apparatus and method of the present invention are illustrated in Figs. 1-5. The ultrasonic apparatus includes an ultrasound probe in which a plurality of transducer elements 15, are arranged two-dimensionally, rather than in a linear, one-dimensional arrangement. A switch array 17 is used for selecting transducer elements 15 in the two-dimensional arrangement. The apparatus also includes: a signal processing unit 8 which applies a delay time to a received wave signal received by the selected transducer element 15 and performs signal processing, an image processing unit 9 which generates an image on the basis of a signal output by the signal processing unit 8, and an image display unit is represented by a monitor 10.

The image processing unit 9 includes a storage unit for storing a first ultrasound image obtained by a scan performed with a first transducer arrangement selected by the transducer element selector and a second ultrasound image obtained by a scan performed with a second transducer arrangement selected by the transducer element selector so as to irradiate an ultrasound beam in a different

direction than a beam direction of the first transducer arrangement. The image processing unit incorporates image calculator for combining the first ultrasound image and the second ultrasound image.

New dependent claims 17-19 are introduced in order to further point more specific features of the present invention. For example, the feature that the plurality of two-dimensionally arranged transducer elements are arranged to form a two-dimensional array is recited in new claim 18, while the features that the apparatus and the method utilize a scan with an oblique angle of ultrasound beam “in which the direction of ultrasound beam forms an angle between 0° and 90° with respect to the surface normal of the transducer element array in the plane defined by the direction of ultrasound beam and the surface normal” are recited in claims 17 and 19.

The features of new claims are illustrated in Figs. 1-6 while the supporting disclosure for the claimed subject matter can be found, for example, at page 12, line 4 to page 15, line 10 of the current Application.

Claims 1-3, 5, 8, and 13-16 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,159,462 to Rocha et al. (“Rocha”); Claims 4, 6, and 9 stand rejected 35 U.S.C. §103(a) as being unpatentable over Rocha; such rejections are traversed and reconsideration and withdrawal of the rejections are respectfully requested.

As to the requirements to support a rejection under 35 U.S.C. §102, reference is made to the decision In re Robertson, 49 USPQ 2d 1949 (Fed. Cir. 1999), wherein the court pointed out that anticipation under 35 U.S.C. §102 requires that each and every element as set in the claim is found, either expressly or inherently described in a single prior art reference. As noted by the court, if the prior art reference does not

expressly set forth a particular element of the claim, that reference still may anticipate if the element is “inherent” in its disclosure. To establish inherency, the extrinsic evidence “must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” Moreover, the court pointed out that inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

Regarding claims 1 and 16, applicants submit that Rocha in Figs. 1-5 and in specification (see, e.g. column 4, lines 23-45) discloses, teaches, or suggests only “a long linear transducer array 30” (column 4, lines 24-25, emphasis added). Claims 1 and 16 recite, *inter alia*, “a plurality of transducer elements for transmitting and receiving an ultrasonic wave to/from an object to be examined two-dimensionally arranged,” (emphasis added, claim 1) and “a two-dimensional array of transducer elements” (emphasis added, claim 16). Applicants traverse the Examiner’s interpretation of the linear transducer array of Rocha at Page 2, lines 18-19 of the Office Action as “a two-dimensional arrangement” as being improper and contrary to the ordinary accepted meaning of “linear”. As represented by Webster’s New Collegiate Dictionary (copyright © 1979 by G. & C. Merriam Co.), which defines “linear”, *inter alia*, as “(2): involving a single dimension.” (Emphasis added). Applicants submit that no generally accepted meaning of “linear” relates to “a two-dimensional arrangement” as interpreted by the Examiner, further submit that “linear” and “two-dimensional” are mutually exclusive. Consequently, Applicants submit that Rocha disclose, teach, or suggest only a one-dimensional linear

arrangement of the transducer elements and, because of this, cannot anticipate or render unpatentable any claim reciting a two-dimensional arrangement or array either under 35 U.S.C. §102 or under 35 U.S.C. §103. Furthermore, as a direct corollary, Rocha cannot anticipate or render obvious any feature directly related to the two-dimensional character of the transducer array, including, for example “**an oblique scan, in which the direction of ultrasound beam forms an angle between 0° and 90° with respect to the surface normal** of the transducer element array in the plane defined by the direction of ultrasound beam and the surface normal,” as recited in claims 17 and 19.

Furthermore, Applicants submit that recitations: “storing means for storing **a first ultrasound image** obtained by a scan performed with a first transducer arrangement selected by the transducer element selecting means and **a second ultrasound image** obtained by a scan performed with a second transducer arrangement selected by the transducer element selecting means so as to irradiate an ultrasound beam in a different direction than a beam direction of the first transducer arrangement, **and image calculating means for combining the first ultrasound image and the second ultrasound image.**” (claim 1), and “storing the first ultrasound image and the second ultrasound image; combining the first ultrasound image and the second ultrasound image; and displaying the combined image” (claim 16) require simultaneous existence of at least two ultrasonic images stored in the memory of the Image Processing Unit.

In contrast, the cited portions of Rocha (e.g. column 5, line 67 to column 6, line 34) disclose imaging process performed sector-by-sector translating sequentially two “possible scan sectors” of the linear array. The process of Roach does not form

even a single image to be stored and subsequently processed. Instead, Roach obtains **maximum of two data segments** corresponding to the common portion of the observed object, and, depending on the embodiment, either selects higher amplitude segment, or averages the segments' data for immediate display on a viewing device sector-by-sector or line-by-line in the manner of an analog TV operation. In short, not only that Rocha **does not have at least two stored images**, as implied in claims 1 and 16, but the **image of interest of Rocha exist only momentarily** as a fluorescent line on a TV-like screen or as a visual impression in the observers' consciousness.

In accordance to the above arguments, the cited portions of Rocha fail to disclose, teach, or suggest each and every feature of independent claims 1 and 16 either under 35 U.S.C. §102 or under 35 U.S.C. §103. As the dependent claims 2-9 and 13-15, dependent from claim 1, incorporate all the features of claim 1 and recite additional features, deficiency of Rocha to anticipate or render obvious claim 1, by the virtue of dependency, results in the deficiency of Rocha to render unpatentable dependent claims 2-9 and 13-15. Therefore, Applicants respectfully request withdrawal of the rejections of claims 1-9 and 13-16 and allowance of the claims. Furthermore, as claims 10-12, according to Page 7, second paragraph of the Office Action, recite additional allowable subject matter, withdrawal of the objection and allowance of claims 10-12 are respectfully requested.


Regarding new claims 17-19, Applicant submits that, as discussed above, claims 17 and 18, dependent from claim 1, and claim 19 dependent from claim 16, further distinguish over cited art reciting additional features.

In view of the above amendments and remarks, Applicants submit that all the claims under consideration, as well as the newly added claims, patentably distinguish over the cited art, and should be considered allowable thereover. Accordingly, an action of a favorable nature is respectfully solicited.

To the extent necessary, applicants petition for an extension of time under 37 CFR § 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 529.44127X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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